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ABSTRACT

This curriculum guide was developed to assist teachers (K-12) in developing comprehensive industrial education programs, establish individual courses, or plan instruction integrated with other academic areas. This booklet's content is presented in eight sections. The first, an introduction for teachers, explains the purpose of the guide. The next three sections briefly provide a rationale for industrial education and define industry and industrial education. The next and longest section identifies five behavioral objectives of industrial education and for each objective presents a matrix to serve as a basis for selecting and organizing content. The elements of industry (system, resource, and coordinating elements) appear on the vertical axis of the matrix while content organizers (elements that provide specific focus for each objective) appear on the horizontal axis. The sixth section discusses three levels in the process of local curriculum planning, development, and review. The next section lists examples of sub-objectives and activities, while the last one presents questions that can be used by teachers to provide students with the opportunity to interact with each other and examine issues. A list of supplementary references and a bibliography are attached. (EM)

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The Wisconsin Guide to Local Curriculum Improvement In Industrial Education, K-12

Revised 1976

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Wisconsin Department of Public Instruction

Dr. Barbara Thompson/State Superintendent

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Preface

SCHOOL DISTRICTS throughout the State of Wisconsin are constantly striving to improve instructional programs. As a result, many schools have requested a resource to use in the development of local curricula. This publication, *The Wisconsin Guide to Local Curriculum Improvement in Industrial Education, K-12,* has been developed to assist school districts in planning appropriate programs. Other resources should be used as well.

This publication is based on the premise that a general knowledge of industry, as an institution in society, is essential to all students and that some will be interested in preparation for employment in industrial occupations. The identified body of content is appropriate for all students; however, methodology and emphasis need to be adjusted to accommodate individual student differences. This publication presents materials adaptable to all levels, kindergarten through grade twelve, for schools to use in developing comprehensive industrial education programs, establish individual courses, or plan instruction integrated with other academic areas.

Another major feature of this publication is that the source of content is industry, in all its facets. Acceptance of this idea suggests that industrial education, as a subject of study, must become more comprehensive than has commonly been the case.

It seems obvious that schools must continually examine society if they are to maintain effective programs. But in recent years, this need for examination has heightened; of special concern are:

(1) accelerating technological advance,

(2) increasingly evident social problems, and

(3) reappraisal of personal values.

Considerable research has been conducted within the field of industrial education during the past decade. The influence of such research is evident in this publication. Also evident are the contributions willingly made by a variety of agencies and especially by members of the curriculum committee charged with the responsibility of developing this guide.

Barbara Thompson

State Superintendent

Acknowledgments

THE DEPARTMENT of Public Instruction expresses its appreciation to the public schools, the university system, and industry for making it possible for staff members to participate in or offer suggestions on the production of this publication.

Special recognition is given to Chancellor Robert Swanson, University of Wisconsin - Stout, for editing this document.

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The Guide would not have been possible without the contributions of the following individuals who gave freely of their time and efforts toward the goal of improving instruction in Wisconsin.

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Recognition is also given to all persons in the State Department of Public Instruction, the Wisconsin University System, industrial education teachers, undergraduate and graduate students, and industrial personnel who gave of their time and energy.

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Introduction for Teachers

FOR MANY YEARS, Wisconsin has offered quality industrial education programs to students enrolled in the public schools. Credit for this is due the teachers who have shown the desire to continually improve programs, keep their content current, and make instruction relevant.

It is with the aim of aiding teachers in these processes that this curriculum guide is presented. It attempts to provide meaningful direction and still leave opportunity for creative approaches in meeting the diverse needs of the school population in all grades, K through 12.

It seems obvious that schools must continually examine society if they are to maintain effective programs. But in recent years, this need for examination has heightened; of special concern are:

(1) accelerating technological advance,

(2) increasingly evident social problems, and

(3) reappraisal of personal values.

The decade of the 1960's saw a surge of experimental and innovative programs in education. There were many major projects in industrial education * and while no single program has been fully accepted by the profession as optimum, the combined weight of perhaps as many as thirty has had at least two effects:

(1) It has emphasized that industrial education is more than a study of the tools, materials, and processes of selected skilled trades and should encompass all the elements of industry.

(2) It has offered a variety of approaches and stimulated teachers to question which program or what parts of several programs will be appropriate for their students.

This curriculum guide is designed to reinforce and extend these effects.

A new wave of concern for career education in the elementary and secondary schools appeared in the late 1960's. Highlighted by statements from the U. S. Commissioner of Education, career education appears an important emphasis of the 1970's. This curriculum guide provides for this emphasis too, because industrial education is an extremely important means of aiding students in occupational awareness and preparation.

It will be noted that this bulletin deals with **Industrial Education.** Historically, the field has had two components: **Industrial Arts** (for general education purposes) and **Trade and Industrial Education** (for vocational purposes). In a few schools, the two have been divorced. While each has a specific emphasis, many more similarities than differences exist; and if students are to be adequately served, it is essential to draw into harmony all aspects of the field. Industrial education is more than a generic term which includes industrial arts and trade and industrial education.

The teaching-learning process involves several interrelated phases: (1) establishing what to teach, (2) designing and implementing strategies for students to experience content, and (3) evaluating the effectiveness of the results. This Guide focuses on the first phase—the selection of content. Five major objectives for industrial education are proposed. To give the objectives substance, content organizers are identified to structure detail.

The Guide is intended for use by teachers concerned with the study of industry at any grade level, kindergarten through twelve. This includes elementary teachers interested in developing units to be integrated into existing instruction as well as middle school, junior high, and senior high teachers whose total assignment is in this subject area. The Guide is only a framework for developing curricula. Individual teachers and departments may obtain additional assistance in curriculum improvement from the Wisconsin Department of Public Instruction, the Wisconsin teacher education institutions and state and regional professional organizations.

It is obvious that if this publication serves even a part of its purpose, change will be the result. Change for its own sake is not the goal, but without it there can be no improvement. Improvement is the goal; change is the process through which it is reached. This Guide is meant to be of aid in making evolutionary changes in existing operations.

There is no question that teachers will have to invest a considerable amount of time in drawing from this Guide for local use. An alternative was to prepare a prescriptive and detailed document; the committee rejected this approach as ineffective and undesirable.

As teachers contemplate change, they come to the conclusion that changes in program often entail increased costs, at least initially. It is the premise here that support, financial and otherwise, is most likely to be forthcoming for well-conceived programs which are carefully explained and can be shown to have promise of meeting student's needs.

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* **Note: A concise review of innovative programs is available in *Innovative Programs in Industrial Education* by Cochran. (See supplementary references)**

Why Industrial Education?

(A Rationale)

TO BE CONTRIBUTING members in their society, individuals must have knowledge and understanding of the world in which they live. In an ever more complex environment, such understanding becomes increasingly difficult. One of the major purposes of our educational system is to assemble, preserve, and transmit knowledge in such fashion as to transmit our culture with emphasis on the worth of each individual within that culture.

If we can't teach every student . . . something we don't know in some form, we haven't a hope of educating the next generation because what they are going to need is what we don't know. What we now have to teach them is to get ready to learn things that nobody knows yet. (Micheels)

The imagination, ingenuity and brainpower required for technical creativity is no less than, and perhaps no different from those required for philosophical activity. (Kranzberg)

A successful education system will promote intelligent decisions based on knowledge, positive attitudes, critical thinking, problem solving procedures, and creativity. It should also serve to develop in each individual a desire to live and act in harmony with the best qualities and ideals of his society.

It is fine to interpret industry to the student, but what is really needed is to interpret society from a technological standpoint and most of all understand how technology affects man . . .

One reason for many of our societal problems is that man does not fully realize the implication of his acts associated with industry and its technology . . . (Lauda)

To achieve these goals requires that education deal with those forces which have great influence and control over human pursuit.

Industry is one of the institutions developed by man to aid in solving his problems and meeting his material needs. Its influence on man, his environment, his modes of living, and even his values is pervasive and often subtle. It is likely that few fully realize the impact of industry on human beings—impacts both positive and negative.

Industry affects the lives of people by providing goods and services and affording individuals means of earning their livings. In this process of coordinating technology and human effort to provide for man's needs, problems result. The extent of industry's efforts and success in dealing with such problems has long-term effects which all must consider.

America's standard of living is considered high. Our homes, transportation systems, shopping centers, recreation facilities, and other aspects of the material culture of America are provided at least in part through industry. Industrial development has made our country a comfortable place in which to live. Certainly a major force in this development has been the profit motive; it is important for society that profits are related to providing better service to human beings.

However, it would be unwise to underestimate the influence of traditional attitudes in holding back the acceptance of new techniques and knowledges, and we shall find many examples of this in the underdeveloped countries which are not change oriented. In the end, societies that do not adjust themselves to new developments are, like the dinosaur, doomed to extinction, although this does not mean that every society should adjust in exactly the same way. (Brown)

Industry is such a potent force in contemporary society that it is important for all citizens to understand it. Thus, it seems essential to provide for its study. Industrial education is the major field of study through which this understanding becomes available.

What Is Industry?

Industry is an institution within society that develops and uses technology in conjunction with human and natural resources to develop, produce, distribute, and service something of value.

Social scientists have described our society as one in which industry has emerged as the decisive, the representative, and the constitutive institution—a society, therefore, in which industry stands out as the dominant social institution. For, unlike other social institutions, industry permeates our culture as a whole.
(Luetkemeyer)

Most industries in our society exist for profit motives. The profit motive system affects the economic condition and the standard of living within our society.

Industry includes many elements identified in this Guide. The extent to which man causes these to function and interact greatly determines the extent of industrialization of a community, state, or nation.

What is Industrial Education?

Industrial education is that segment of education which draws its body of content from industry. It provides for a comprehensive understanding of this societal institution as well as the development of competencies related to various elements of industry.

A comprehensive program of industrial education will involve study of the total institution of industry. Properly conceived, such a program will deal with all the elements which make up industry and the ways in which they interact. Consideration of the impacts of industry on man and society will be important. Industrial education also provides students the opportunity to develop competencies for entry into the world of work.

Objectives and Content Components

Objectives are the obligations a field of study assumes and constitute promises to students and the public of what will be studied and for what purpose. With the competition for students' time and public funds, it is important that the objectives are clearly understood by students, teachers, and the public. Industrial education in Wisconsin offers opportunities summarized by the following statements.

Objectives

To provide students the opportunity:

TO work with elements of industry to gain understanding of how they function in producing goods and services.

TO understand the interdependence of society and industry.

TO explore the context in which industry has developed and continues to develop.

TO explore occupational areas as a basis for selecting a career and understanding the pursuits of others.

TO prepare for entry into appropriate industrially related occupations and develop a base for further occupational education.

Content Organizers

Objectives broadly identify the responsibilities of industrial education in Wisconsin. If they are to become operational, it is necessary for teachers and curriculum workers to select content and design learning experiences in keeping with them. To provide a basis for the selection of content and to add meaning to the statements, a series of elements derived from an analysis of industry has been structured under each objective. To establish a content base which permeates the five objectives, industry is presented as eleven elements in three categories. The elements are those parts fundamental to the existence of industry which, when properly coordinated, result in a functioning unit. These elements are categorized as system elements, resource elements, and coordinating elements.

System Elements — organizational plans which when coordinated produce results. Systems are activated by the personnel within them (this does not preclude the activation of machine systems by personnel).

Resource Elements — human and natural means of supplying wants or minimizing deficiencies—stock or supply upon which one can draw when necessary. The means collected or possessed by industry in order to allow its systems to operate, produce, distribute and service something of value.

Coordinating Elements — those elements required which exist within each system for the purpose of bringing resources together so that the systems may operate to produce.

Content organizers are identified with each objective to provide specific focus. These organizers, along with the elements of industry, provide a basis for establishing finer detail. On the matrix for each objective the elements of industry appear on the vertical axis while content organizers appear on the horizontal axis. The following paragraphs introduce the content organization for each objective.

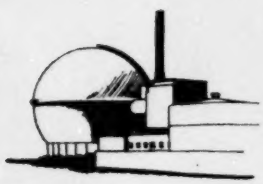
Objective

To provide students the opportunity to work with elements of industry to gain an understanding of how they function in providing goods and services.

The structured body of content to make this objective operational is the elements of industry. Eleven interrelated elements have been identified, categorized and presented as a basis for organizing finer detail. The elements are categorized into (1) system elements, (2) resource elements, and (3) coordinating elements. These elements interact with content organizers to provide detail. The organizers are: plan, execute, evaluate; sources, kinds, characteristics; and systems and resources. Systems and resources appear here as content organizers and they also serve as categories for elements of industry. The explanation for this is that these two categories of elements must be influenced by management and communications thus appearing as content organizers.

To provide students the opportunity to work with elements of industry to gain an understanding of how they function in providing goods and services.

System Elements	Plan
Research and Development - investigation and experimentation conducted for the purpose of arriving at a solution to an identifiable need	*establishing a systematic plan to accomplish an end *identifying societal wants for goods and services *solving problems of industry, technology and society
Production - the methods and processes used in the output of goods and services	*developing systems for producing goods and services considering the elements of industry
Marketing and Distribution - flow of goods and services from producers to consumers	*establishing marketing procedures *developing systems to transport goods and services
Maintenance and Services - servicing property, equipment and people	*identify and predict maintenance and service problems *designing maintenance prevention plans *developing corrective plans
Resource Elements	**Sources**
Finance - acquisition and utilization of financial resources in industry	*determining sources of financial resources such as individuals, groups, institutions and governments
Personnel - human resources essential to industry	*identifying sources of personnel such as employment agencies, apprenticeship programs and school programs at many levels of preparation
Materials - substances from which products are produced	*identifying sources of materials that are extracted, grown, and manufactured
Power and Energy - the fundamental ingredient in all mechanization and technological development which may be transformed into work	*identifying sources of energy that are in continuous supply, supplies are exhaustible and those supplies which are replenishable through judicious utilization
Property - holdings or possessions of an enterprise upon which value can be placed	*determining sources of property such as purchased, inherited and granted
Coordinating Elements	**Systems**
Management - operational activities which provide for the leadership of an enterprise	*planning, making decision, determining policies and standards, delegating authority and responsibility, organizing and evaluating
Communications - interaction resulting in the exchange of ideas and information	*coordinating communications of people to people, people to machines, machines to people, and machines to machines



Execute	Evaluate
*designing goods and services *developing plans by experimentation, models and surveys	*choosing solutions for implementation and developing evaluative criteria to determine if goods and services satisfied societal desires
*implementing plans by obtaining resources, developing personnel, and performing operations	*evaluating the efficiency of the system of producing goods and services
*conducting marketing procedures *implementing systems of transportation	*verifying if the research and subsequent plans were effective and if viable alternatives were considered *determining if goods and services were readily made available
*conducting preventive maintenance plan *conducting maintenance by diagnosing, replacing parts, repairing, and adjusting	*determining if in plant and on site maintenance were effective *evaluating effectiveness of product maintenance plans and product reliability
Kinds	**Characteristics**
*selling stock and acquiring loans, subsidiaries and grants	*considering economics of acquiring various kinds of financial resources
*identifying human resources as unskilled, semi-skilled, skilled, highly skilled	*considering human resources in light of life style expectations, duration of employment, commitment to the job, extent of responsibility
*selecting appropriate materials such as ceramic, plastic, petroleum, wood, metal, textile, paper, rubber, cement and foods	*selecting materials on criterion bases of composition, processability, availability, cost, aesthetics and function
*selecting appropriate kinds of energy such as heat, chemical, mechanical and atomic	*identifying energy on criterion bases of controlability, storability, transferability, applicability, availability, and environmental effects
*acquiring property of various kinds such as land, buildings, equipment, copyrights, franchises, patents, rights, & capitol.	*considering real and intangible forms of property
Resources	
*coordinating resources and making resources available	
*coordinating and transmitting information about resources through the systems elements	

Objective

To provide students the opportunity to understand the interdependence of society and industry.

The structured body of content of this objective identifies the areas where society and industry interact and have reciprocal effects. Here, the dynamics are such that it is not possible to categorize social situations to correspond with any single element of industry. Society has many elements as does industry. The role of industrial education is not to analyze society, but to provide for a study of industry as an institution of society. Industry, therefore, must be studied as it corresponds to dynamic societal situations.

To provide students the opportunity to understand the interdependence of society and industry.

System Elements	Dynamic Societal Situations
Desearch and Development — Investigation and experimentation conducted for the purpose of arriving at a solution to an identifiable need	*Supply and demand* — industrial production is determined by societal demands for goods and services.
Production — the methods and processes used in the output of goods and services	*Industrial assets* — industries provide assets to the communities in which they are located; communities become dependent upon these assets from industry.
Marketing and Distribution — flow of goods and services from producers to consumers	*Location of industry* — industries are attracted to and are dependent upon areas in which there are human resources; people are attracted to areas in which industry exists.
Maintenance and Services — servicing property, equipment and people	*Human resources* — industry depends upon human resources to accomplish its goals and people depend on industry to fulfill their needs.
Resource Elements	*Financial dependencies* — man as a member of society is dependent upon industry for his financial support; industry is dependent upon society for its financial support.
Finance — acquisition and utilization of financial resources in industry	*Environment and industry* — industry operates to meet the needs of man and creates an environmental imbalance that is subject to limitations imposed by society.
Personnel — human resources essential to industry	*Profit factor* — the satisfaction of industry's motivation is partially dependent both upon man as a resource and as a consumer.
Materials — substances from which products are produced	
Power and Energy — the fundamental ingredient in all mechanization and technological development which may be transformed into work	
Property — holdings or possessions of an enterprise upon which value can be placed	
Coordinating Elements	
Management — operational activities which provide for the leadership of an enterprise	
Communications — interaction resulting in the exchange of ideas and information	

Objective

To provide students the opportunity to explore the context in which industry has developed and continues to develop.

This body of content traces the development of industry historically, indicating how it has arrived to its present state of development. Projections for the future are important considerations also. Here the elements of industry interact with content organizers of past, present, and future to provide detail.

. . . training in skills is no longer an end in itself but simply a means to understand the materials, operations, and nature of our industrial society. (Kranzberg)

An eminent British physicist and engineer, Professor Dennis Gabor, has said that modern man faces three great dangers: destruction by nuclear war, over-population, and the approach of the age of leisure and suggests that these are all aspects of a single danger: our inability to adjust to our own technology. The philosopher Hegel said many years ago: Man, insofar as he acts to change nature, acts to change himself. (Brown)

To provide students the opportunity to explore the context in which industry has developed and continues to develop.

System Elements	Past
Research and Development - investigation and experimentation conducted for the purpose of arriving at a solution to an identifiable need	*discovering by accident; by trial and error, from a small research base, by individuals, with limited technological capability
Production - the methods and processes used in the output of goods and services	*satisfying only the needs of an individual and his family
Marketing and Distribution - flow of goods and services from producers to consumers	*exchanging goods and services within a local market with limited transportation capability
Maintenance and Services - servicing property, equipment and people	*maintaining by the owner
Resource Elements	**Past**
Finance - acquisition and utilization of financial resources in industry	*financing by proprietorships, limited partnerships and small loans
Personnel - human resources essential to industry	*diversified skills in crafts with limited formal preparation
Materials - substances from which products are produced	*plentiful supplies of a limited number of natural materials not used to full potential
Power and Energy - the fundamental ingredient in all mechanization and technological development which may be transformed into work	*limited kinds of energy with vast potential but insufficient technology
Property - holdings or possessions of an enterprise upon which value can be placed	*small holdings with limited investment and simple transactions
Coordinating Elements	**Past**
Management - operational activities which provide for the leadership of an enterprise	*managed primarily by owner
Communications - interaction resulting in the exchange of ideas and information	*limited to audible words, handwritten messages and graphic illustrations

Present	Future
*discovering by coordinated research efforts, experimentation, with an extensive research base, and sophisticated technological capability	*expanding research base, instant information retrieval, highly specialized personnel and extensive technological capability
*standardizing parts and mass producing with automation and cybernation	*personalizing products, indivdual expression and modular components
*improving modes of transportation, processing, packaging and advertising	*increasing emphasis on product distribution and allied services
*maintaining products and production equipment by dealer maintenance, manufacturer warranties and service industries	*increasing demand for services *replacing modules and recycling of products

Present	Future
*financing by corporate stock sales and government subsidies	*computer assisted credit card transactions
*skilled human resources with specialized competencies trained in many formal programs	*highly specialized, educated individuals
*newly discovered kinds of natural and synthetic materials being used more nearly to potential	*increasing use of synthetics, new material sources discovered, new processes developed, depleting some supplies, replenishing other supplies and expanding reclaimation
*emerging kinds of energy to satisfy a high demand *depleting some existing sources of energy	*harnessing new sources efficiently to meet expanding demands
*corporate ownerships, large investments and complex transactions	*corporate ownerships, large investment, complex technologies and legislated controls

Present	Future
*skilled managers employed to manage large corporations *owners manage proprietorships and limited partnerships	*expanding responsibilities, international implications, governmental participation and a vast information base
*vast capabilities via electronics and graphic innovations	*linking continents and planets via satellites, computers and lasers

Objective

To provide students the opportunity to explore industrial occupational areas as a basis for selecting a career and understanding the pursuits of others.

A large segment of our population is employed by industry in a wide variety of industrially related occupations. Industrial education, therefore, should provide students with information which will serve as a basis for: selecting a career, developing humanistic skills and understanding the pursuits of others.

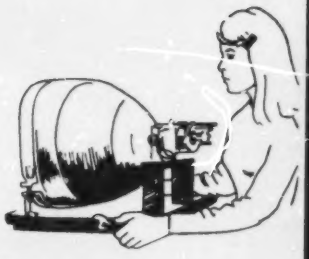
During the career selection process, students should be made aware of the elements of industry, job opportunities, the basic requirements of an

To provide students the opportunity to explore industrial occupational areas as a basis for selecting a career and understanding the pursuits of others.

System Elements	Self Awareness Here I am—I Can do things:
Research and Development - investigation and experimentation conducted for the purpose of arriving at the solution to an identifiable need	*defining problems, collecting information, analyzing data, and proposing and evaluating solutions
Production - the methods and processes used in the output of goods and services	*planning and controlling process; cutting, shaping and forming materials; and fabricating components
Marketing and Distribution - flow of goods and services from producers to consumers	*advertising, selling, transporting and servicing products
Maintenance and Services - servicing property, equipment and people	*diagnosing and correcting problems and testing solutions
Resource Elements	
Finance - acquisition and utilization of financial resources in industry	
Personnel - human resources essential to industry	
Materials - substances from which products are produced	
Power and Energy - the fundamental ingredient in all mechanization and technological development which may be transformed into work	
Property - holdings or possessions of an enterprise upon which value can be placed	
Coordinating Elements	**Self-Awareness**
Management - operational activities which provide for the leadership of an enterprise	*thinking objectively, organizing activities, making decisions and evaluating
Communications - interaction resulting in the exchange of ideas and information	*initiating and receiving communications

occupation and how these compare with the students' capacities, talents and interests.

The body of content from which teachers draw to make this objective operational is the occupations of industry, structured around the elements of industry and content organizers of self awareness, career awareness and career exploration.



Career Awareness There are jobs to be done:	Career Exploration I would like to assess my interests by:
*associated with research and development in industry	*experiencing some activities of people that work in research and development
*producing goods and services, in factories and on sites	*experiencing some activities of people that work in producing various kinds of goods and services
*distributing goods and services to people	*experiencing some activities of people that distribute goods and services
*maintaining and servicing products for consumers and equipment for production	*experiencing some activities of people that maintain production equipment and consumer products

Resource Elements are static and are operationalized by System and Coordinating Elements. Therefore, career opportunities exist only in the System and Coordinating Elements.

Career Awareness	Career Exploration
*involving decision making, organizing, leading and evaluating	*experiencing some activities of people who make decisions, lead, organize and evaluate
*associated with internal and external communications	*experiencing some activities of people who communicate within industry and between industry and other publics

Objective

To provide students the opportunity to prepare specifically for entry into appropriate industrially related occupations and develop a base for further occupational education.

The content presented to students to accomplish this objective is drawn from task analyses of industrially related occupations. The analyses will reveal the basic skills, experiences, and knowledge of which advanced education for occupational entry is based.

Analysis of the competencies required will reveal those common to all or large numbers of occupations of job clusters and may involve basic attitudes, manipulative skills, as well as common abilities to read, write, communicate, and work with others.

The matrix that follows indentifies research and development, production, marketing and distribution, and maintenance and service as the systems of industry. Also identified as coordinating elements, are management and communications. Many clusters of occupational opportunities lie within these categories. To establish appropriate content, it is necessary to analyze each category and reduce each to clusters of occupations for study. Teachable content for a cluster of occupations may be obtained by stating job tasks as perceived by the curriculum developer, employees in the occupation and employers. To add balance to this process, technical competencies and human relationships are used as content organizers.

To provide students the opportunity to prepare specifically for entry into appropriate industrially related occupations and develop a base for further occupational education.

System Elements
Research and Development - investigation and experimentation conducted for the purpose of arriving at the solution to an identifiable need.
Production - the methods and processes used in the output of goods and services.
Marketing and Distribution - flow of goods and services from producers to consumers.
Maintenance and Services - servicing property, equipment and people.
Resource Elements
Finance - acquisition and utilization of financial resources in industry.
Personnel - human resources essential to industry
Materials - substances from which products are produced.
Power and Energy - the fundamental ingredient in all mechanization and technological development which may be transformed into work.
Property - holdings or possessions of an enterprise upon which value can be placed.
Coordinating Elements
Management - operational activities which provide for the leadership of an enterprise.
Communications - interaction resulting in the exchange of ideas and information.

Technical Competencies	Human Relationships
*analytical thinking, technical understanding, and research knowledge: defining, collecting, analyzing, proposing and evaluating	*relate to individuals and groups at various levels within the industry and with the general public
*safe operating practices and quality work	
*advertising, selling, servicing, transporting and product understanding	
*analytical thinking for diagnosing, technical skills for correcting, and evaluative understanding for testing	*relate to supervisory personnel and peers
	*relate to management and labor
Resource Elements are static and are operationalized by System and Coordinating Elements. Therefore, career opportunities exist only in the System and Coordinating Elements and are organized within these two categories.	
Technical Competencies	
*leading, organizing, decision making, communicating, information gathering, enlisting support of others, and utilizing resources effectively	*relate to consumers, transporters, service personnel
*man to man, man to machine, machine to man, and machine to machine.	

Using the Guide for Local Curriculum Planning, Development, and Review

This Guide is intended for use in situations where a new industrial education curriculum is being developed, an existing program is being examined with a view to revision, or where an individual teacher wishes to examine what he is doing in his part of the program.

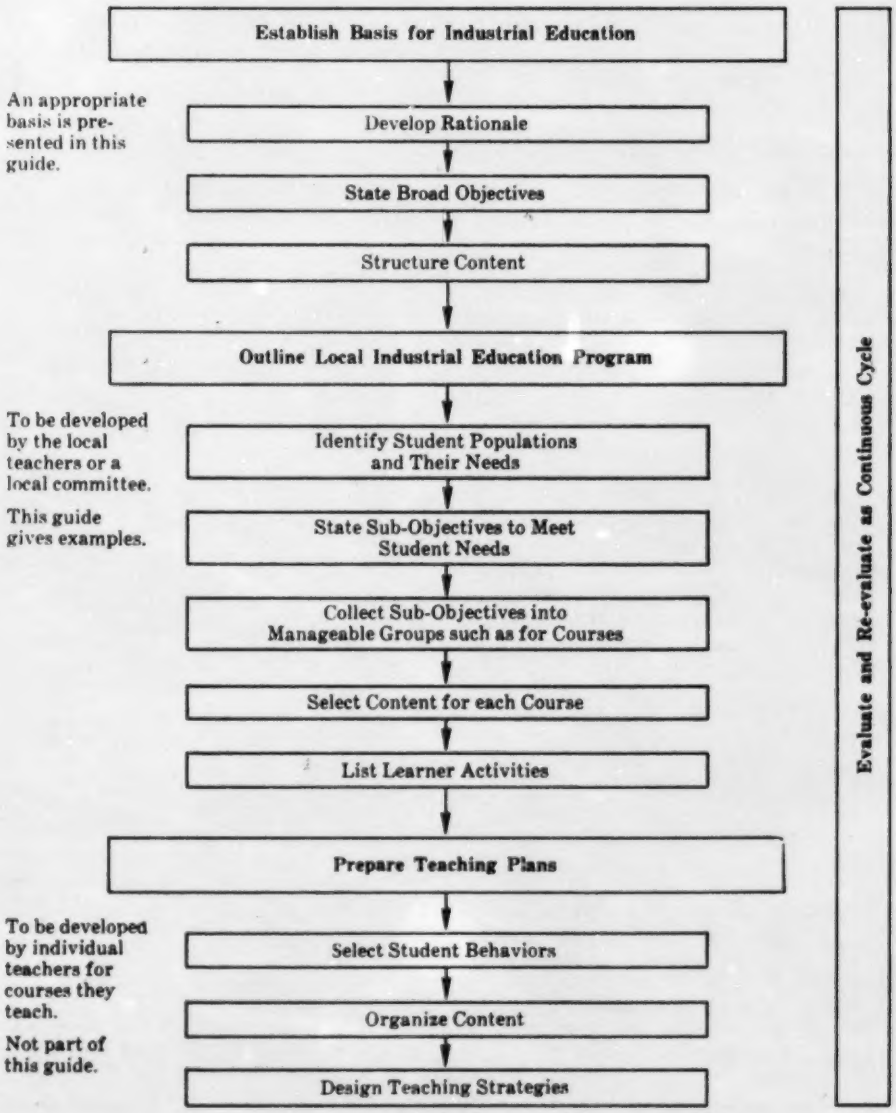
For any of these situations it will be well to look at the total process of developing an industrial education curriculum, K-12. Three levels of coordinated planning and decision making are essential. These levels are presented here and are diagramed below.

(1) **Establishing the basis for industrial education in the school system, K-12.**

(2) **Outlining the total curriculum, usually in terms of groups of experiences integrated with other learning activities in the lower grades and specific courses and groups of courses at the upper levels.**

(3) **Preparing teaching plans for the specific experiences and courses which will make up the total program.**

Curriculum Planning, Development and Review Model


Establish Basis for Industrial Education
An appropriate basis is presented in this guide.
Develop Rationale
State Broad Objectives
Structure Content
Outline Local Industrial Education Program
To be developed by the local teachers or a local committee.
This guide gives examples.
Identify Student Populations and Their Needs
State Sub-Objectives to Meet Student Needs
Collect Sub-Objectives into Manageable Groups such as for Courses
Select Content for each Course
List Learner Activities
Prepare Teaching Plans
To be developed by individual teachers for courses they teach.
Not part of this guide.
Select Student Behaviors
Organize Content
Design Teaching Strategies
Evaluate and Re-evaluate as Continuous Cycle

(1) Establishing and reviewing the basis for industrial education in the school system, K-12.

The first sections of this Guide are addressed to the three essential factors which set the basis for a total program of industrial education. They are:

(a) A rationale for studying industrial education, including definitions of industry and industrial education.

(b) Five broad objectives for the field, consistent with and leading from the rationale.

(c) A structure for organizing the content from which to draw in developing the curriculum and individual courses and learning experiences.

This bulletin presents a particular rationale, objectives, and a content structure. Teachers and curriculum planners who study and accept them have an established base for curriculum and course planning. School systems which find them inappropriate or inadequate must develop their own to provide essential points of reference.

(2) Outlining a total curriculum for industrial education, K-12.

Once the basis for the study of industrial education is established and accepted, it is necessary to identify the components of the curriculum to provide an integrated and articulated set of experiences. Five phases are involved.

(a) Identify the student populations to be served, develop a rationale for serving them, and determine their needs as a basis for formulating sub-objectives for the courses or groups of experiences which will comprise the curriculum.

(b) State sub-objectives which meet student and community needs and which reflect the broad field objectives with sufficient statements to set direction for content selection.

(c) Collect the sub-objectives into various manageable groups to serve as guidelines for courses or groups of experiences appropriate to the student populations to be served.

(d) Select content for each course reflecting each sub-objective and the field objective (s).

(e) List learner activities which will make the course content operational.

Following is an explanation of the five phases of outlining a total curriculum for industrial education, K-12.

(a) Identify the student population to be served and develop a rationale for them as a basis for determining the courses or groups of experiences which will comprise the curriculum.

The initial step in deciding on the courses or groups of experiences which will make up the total curriculum for industrial education is to identify, in terms of their needs, the various sub-populations which make up the school population, K-12.

As pointed out in the rationale presented in this Guide, there are needs common to the entire population; these may be called general education needs. In such cases, sub-populations are defined in terms of age, maturity, and experience levels. The school is already organized on this kind of leveling through the grade system, kindergarten to grade twelve. Grades are commonly grouped as elementary, middle-junior high, and senior high school. The courses designed for all will differ in terms of the complexity of understanding and activity possible at each grade level.

For example, the rationale in this Guide proposes that all citizens need to understand how the elements of industry function to provide goods and services. At the elementary level, the experiences may simply attempt to get students to understand that production of a product requires labor, materials, and processing equipment. At a high school level, the student may be capable of seeing a more complex relationship among the elements—for example, capital spent for extensive machinery and a greater amount of advertising may increase volume and result in a lower per unit cost for labor required to build a product.

There are other sub-populations to be served with courses on the basis of individual needs and characteristics such as:

(1) occupational goals
(2) interests that have developed in certain kinds of activities
(3) special abilities identified

In each school system, there are sub-populations of students who plan to go to work immediately upon graduation from high school. The courses identified for these students in Wisconsin high schools are the "capstone" courses, aimed at the development of job-entry skills. In certain career areas where advanced education beyond high school is required for job entry, the capstone course may provide the basis for further job preparation before entry.

Other sub-populations of students may have developed an interest in an industrial area, electronics for example, with no particular thought of this as a career. Such groups may be served by advanced courses aimed at extending interest based on refined knowledge and skill.

Sub-populations of students identified to have mechanical and artistic abilities may be served by courses in planning and product design. The course may or may not have a vocational emphasis.

Courses and experiences should be developed in terms of sub-populations to be served. For various reasons, it will not be possible to serve all of the identified sub-populations and priorities will have to be set in terms of the school's rationale and objectives for industrial education.

(b) State sub-objectives which meet student and community needs and which reflect the broad field objectives with sufficient statements to set direction for content selection.

Broad program objectives set the stage and give overall direction to a field of study but they must be further refined and detailed if they are to be of value in designing specific courses and selecting teaching materials and methods.

The process of detailing objectives and making them appropriate to specific sub-populations is one of examining each broad objective in terms of the identified need and maturity level of the sub-population. Knowledge of the characteristics of pupils of various age levels is thus very important for proper specification of objectives. Certain of the broad objectives for the field will not be applicable for particular sub-populations. As an example, the field objective having to do with preparation for occupational entry would not be appropriate to elementary or junior high school level students. On the other hand, for this same objective (preparation for occupational entry) especially at the "capstone" level, community needs in terms of the geographical placement area would be another most important consideration.

Keeping in mind the student population needs and (where appropriate) the community needs, the content as presented under the field objectives will be most helpful in suggesting sub-objectives.

(c) Collect the sub-objectives into various manageable groups such as those for the courses or groups of experiences appropriate to the student populations to be served.

Collect and organize the sub-objectives into various manageable and intra-related groupings, so that they can serve as guidelines for development of, or revision to, the courses intended to contribute to meeting the needs of the school population to be served.

The nature and extent of each of the groupings of sub-objectives should assist in determining the approximate amounts of time (emphasis) to devote to each of the several courses suggested to be developed or revised. Upon careful consideration, some groupings will likely suggest the establishment of units or courses of one-half school year, or less, in length. A few groupings will be so extensive as to reveal necessity for two-year, or perhaps three-year, course sequences within given content areas.

(d) Select content for each course reflecting each sub-objective and the field objective(s).

Sub-objectives already identified have established content within certain limitations. By referring to the content organizers and subsequent detail, the selection of content can be made. The selection is in terms of the student population already identified, the qualifications of the faculty who will teach this population, the facilities and time blocks within which the instruction is to occur and in terms of the parents, school board members and administrator whose influence may also be felt in decisions with respect to what shall be taught.

As an example, the field objective concerned with understanding the elements of industry suggests that the elements include system, resource, and coordinating elements. Within each of these activities, planning, executing and evaluating takes place. As a sub-objective in the junior high school "understanding how specialization of effort increases efficiency in production" limits the range of content. The content structure suggests elements of production, management, communication and materials. Each of these, as well as other elements, will serve as areas from which content may be selected. Information within the cells of the model under "plan", "execute", or "evaluate" will further aid in selection.

The entry under "execute" and opposite production called "perform operations" suggests content where a variety of activities might be employed to illustrate specialization. To make five hundred candlesticks it would be quite efficient to have each individual do all of one kind of operation. In contrast, each worker might perform all the operations involved in producing a quantity of candlesticks with no use of specialization.

Other appropriate content is identifiable upon examination of the suggested structure to meet specific needs.

(e) List learner activities which will make the course content operational.

Objectives give direction to a curriculum and its parts. The structured body of content provides substances from which to draw teaching materials. An important bridge between objectives and content is the specification of tasks that students will be able to perform as a result of instruction.

There are two kinds of tasks. In a program for job entry the learner tasks will often duplicate or simulate those required on the job. In programs for general education purposes, the task is used to facilitate acquisition of knowledge, skills, and attitudes and reveal the extent to which they have been acquired.

Tasks are action oriented, specifying what the student will do, not simply what he will know, though, of course, that is involved too.

The process of specifying tasks involves examining the sub-objectives against appropriate parts of the content structure and conceiving of activities which call for understanding and application of knowledge and skill—often in an attitudinal context. The process is a means of making content operational.

This section of the Guide outlines a system for curriculum improvement. A means of developing a rationale, stating broad objectives and structuring content are included. Also included is a means of identifying student populations to be served, stating sub-objectives, collecting sub-objectives into courses, identifying content, and selecting learner activities. The following pages contain examples of sub-objectives and activities which are appropriate to each of the broad objectives for industrial education.

As a result of experiencing content through various learning activities, students should be provided the opportunity to interact, make personal judgments, and draw conclusions. Examples of questions and statements that might stimulate such a process are provided on pages 21-23.

(3) Preparing teaching plans for industrial education courses, units and experiences.

Once the basis for the study of industrial education is established and accepted, and the total program is outlined, it is necessary to select student behaviors, organize content and design teaching strategies. Although these activities are essential, the process of course construction is not a part of this Guide.

Examples of Sub-Objectives and Activities

To provide students the opportunity to work with elements of industry to gain understanding of how they function in producing goods and services.

Elementary

Sub-objectives	Activities
Production element Develop an understanding of how goods may be produced	*construct a simple cotton gin and remove seeds from cotton. (unit on textile industry) *make butter, ice cream or cookies using production line techniques. (unit on the food industry)
Materials element Understand that raw materials can be converted to products by such simple processes as cutting, forming and shaping.	*cut simple forms from plywood with a jig saw. *mold modeling clay or "play dough" in a small mold or press.
Energy element Become aware that there are many sources of power.	*construct a simple windmill and operate it with a fan. *replace batteries in flashlight so they work properly. *generate steam in a model steam engine. *operate a model airplane engine.

Middle-Junior High

Production element Understand how specialization of effort increases efficiency of production.	*participate in a group production project where each person has a specialized job to do. *learn to do a narrow skill extremely well, observing the short time involved as compared to having to do all parts of a project.
Marketing element Understand how a manufacturer might determine if a product should be produced.	*conduct a sample survey of the school to determine if a product scheduled to be produced will be marketable. *design a way to communicate your ideas with the people of the sample survey by using drawings, photographs, phototypes and other media.

Marketing element Understand the importance of packaging a product.	*package products produced by a corporation in such a way that it will protect the product, be inexpensive to produce and be attractive to the consumer.

High School

Production element Understand that a breakdown in any element of industry can make the other elements ineffective or inoperative.	*trouble shoot a production line on the basis of work stopages. *find examples of increased maintenance resulting from faculty design or materials specification. *find examples where a shortage of one kind of personnel kept others from functioning properly.
Property elements Understand how equipment needs are determined and how purchases are made.	*determine specifications for a new machine to cut wood to satisfy the needs of the school laboratory or any machine needed in the school lab. *let bids to various vendors and determine the best machine buy based on specifications and cost.
Communications element Understand how information can be stored for easy retrieval.	*develop an inventory system for school laboratory supplies. *using keysort cards, design a system that will enable you to alphabetize all the industrial education students as a total group and as individual classes.

To provide students the opportunity to understand the interdependence of society and industry.

Elementary

Sub-objectives	Activities
Finance element Understand that industry must sometimes borrow money to meet expenses.	*borrow money to purchase materials to manufacture a product. *determine the cost at which the product must be sold to repay the loan and the interest on the loan. *consider how to finance production if loans are not available.
Marketing element Understand that advertizing is an integral function of industry.	*design an advertising campaign to convince people they need the product your company is producing.

Middle-Junior High

Personnel element Understand that different skills are needed for different jobs.	*write job descriptions for managerial jobs. *write job descriptions for production jobs. *compare the descriptions and consider how the skills are different and how they are alike. Also, compare how workers might obtain various competencies.
Materials element Develop an understanding of efficient use of materials.	*design and produce a product that could be constructed from typical small pieces of material left from the production of large products.

Senior High

Communications element Understand the public relations responsibilities of industry	*design a publicity campaign describing how the dust control system and eye production program protect workers in laboratories.
Property element Understand that capital holdings must be considered in the cost of production.	*determine depreciation of equipment and figure this into the market price of a product being marketed.

To provide students the opportunity to explore the context in which industry has developed and continues to develop.

Elementary

Sub-objectives	Activities
Materials elements Understand how materials can be changed through processing.	*construct a model log cabin typical of early America using natural materials. *visit a home construction site and collect modern day construction materials. *compare the materials used in the cabin and the materials used in a modern home.
Production element Understand that production is not limited to hard goods manufacturing.	*develop a ten minute puppet play that will help your classmates understand the mathematical concept of addition. *build background props for the play.
Communication elements Understand that television was not available to pioneer children as a way of learning.	*using a video tape recorder, tape the play so it can be shown to other classes on television.

Middle-Junior High

Research & Development element Understand the changing methodologies of industrial research.	*develop a product or a solution to a problem by working alone as an early American inventor might have worked. *develop a product or a solution to a problem by working with a team of people with a variety of skills. *compare the products or solutions of the two methods of research and development.
Production element Understand how efficiency may be improved through mass production.	*along with members of the class, construct simple projects independently as early American craftsmen might have. *set up a production line and mass produce the same simple project as a group. *compare both the quality and quantity of manufacturing using the two techniques.

High School

Maintenance & Service element Understand that when the cost of repairing a small appliance reaches a particular point, it is no longer feasible for a consumer to have it repaired because of our capability to produce inexpensive products.	*establish a small appliance repair shop, advertise for business, and repair appliances calculating the real cost of the repair work. *considering overhead, parts and labor, determine the cost of repair and the point at which it might be advisable for the consumer to purchase a new appliance.

Maintenance & Service element Understand that equipment must be maintained if it is to function efficiently for a period of time for which it was designed.	*design a maintenance plan for the school shop and project replacement needs and major repairs for the next five years.

To provide students the opportunity to explore industrial occupational areas as a basis for selecting a career and understanding the pursuits of others.

Elementary

Sub-objectives	Activities
Research & Development element Be aware of self, related to research and development activities of people.	*survey a group of classmates to determine their favorite kinds of cookies. *decide how to make enough cookies for the class in the fastest way possible.
Production element Be aware of self, related to production activities.	*following a recipe, obtain the necessary ingredients for a large number of cookies. *mix the batter and bake the cookies. *place the cookies in packages.
Distribution element Be aware of self, related to distribution activities.	*design a poster stating that cookies will be available at milk time. *distribute cookies so each student will receive an equal number.

Middle-Junior High

Production element Understand that many people with special skills are needed to complete a complex product.	*visit a construction site and list the many skilled craftsmen that are needed to construct a new home. *discuss how these craftsmen might have developed the skills they use every day in their work.
Service element Understand that people provide services as well as goods	*list the people in your school that through their work provide services.
Research & Development element Understand that industrial career opportunities exist that are challenging to creative people.	*design a jig for a production run which will permit repetitive operations to be performed with a high degree of accuracy.
Production element Understand that some industrial occupations exist which require repetitive operations.	*take a position on a production line which requires a repetitive operation to be conducted over a long period of time.

High School

Management element Understand that career opportunities exist in industry which are people oriented.	*in an enterprise, play the role of management and negotiate a labor dispute concerning working conditions.
Service element Understand that some careers require both technical and humanistic skills	*tune a lawnmower engine as an employee of the small engine repair enterprise established by your class. Explain to the customer what you did to the engine and what the charges are for—parts and labor. *negotiate a price for printing a supply of stationery for the local chapter of Future Business Leaders of America.

To provide students the opportunity to prepare specifically for entry into appropriate industrially related occupations and develop a base for further occupational education.

High School

Sub-objectives	Activities
Maintenance & Service element Be able to properly tune an automobile	*develop a logical approach of diagnosing the problem. *determine and make necessary adjustments and parts replacements. *evaluate the results to determine if the problems have been solved.
Research & Development element Be able to modify existing drawings to improve the function of a machine part.	*identify the malfunction of the existing part. *identify possible solutions to the problem. *make sketches of the best solutions. *discuss the sketches with someone in a supervisory role. *make the necessary revisions on the existing drawing.
Production element Be able to layout the proper slope for a sewer pipe leading from a structure to the main.	*determine the necessary slope per foot of distance. *using a transit determine the elevation of the structure and the main. *determine the elevation of each end of the sewer pipe.
Production element Be able to establish a procedure for machining a casting to predetermined specifications.	*interpret the print to determine the necessary specifications and processes. *machine the casting using the tools and equipment best suited for the task. *maintain tolerance demanded by the specifications.

Provisions for Learners to Interact, Make Judgments and Draw Personal Conclusions

Today as perhaps never before, young people are searching for the answers to questions such as: Should we produce the conveniences we have come to depend upon at the expense of increasing pollution? Should industry grow in size and efficiency at the cost of human identity? Should products continue to be produced if it means exhausting unreplaceable raw materials for the convenience of a comparative few or adversely affecting mankind's health? What is truth in advertising and selling products? In searching for answers to these and other value-based concerns, students are faced with examining their own personal values and then considering what they deem to be appropriate action. The classroom provides a needed and viable opportunity for young people to consider the possible alternatives and the desirable and undesirable consequences of each alternative before they arrive at their own personal position. Through discussion and examination of some of our traditionally held beliefs (values), students can begin to understand and perhaps eventually contribute to the solution of the complex problems we face.

For teachers the examination of issues in the classroom requires openness, honesty, and a desire to help students arrive at their own personal positions. Teachers will need to provide experiences and raise questions that require students to consider all sides of issues. Most importantly, the teacher needs to view the classroom as a place where differences are expected, respected and encouraged; where students are challenged, not threatened; where learning is regarded as an active process, as a personal experience; where tentative conclusions based on the learner's own reading, his own searching and his own thinking are increasingly the norm.

The following questions and considerations are offered to teachers as suggestions for "triggering" discussions and examination of some of the issues facing our technological world today:

Objective 1

1. Even though a larger number of cookies can be made using the production line technique, shouldn't individual workers have the option to engage in all of the steps of production from beginning to end?
2. Items that are produced in an industrial society are determined in large measure by consumer demand. Does industry have any responsibility to shape demand? In what directions?
3. What is the meaning of "cost" and "benefit" in the cost-benefit decision making? What about social costs?

Objective 2

1. What is industry's responsibility to the consumer in terms of abuse or misuse of the products they produce? Should industry become involved in moral issues involving their products such as cigarettes, alcohol, etc.?
2. Do you feel that industries and communities can work together to the mutual benefit of both? Describe some of the problems and advantages to both the industry and the community and how they might cooperate.
3. Many industries are searching for new areas to locate and communities are looking for industry to provide jobs and bring more money into the community. How can communities decide if the benefits of a new industry with its advantages is worth the disadvantages such as more people, pollution, etc.?
4. Many problems arise between employer and employee. In these situations both usually suffer. What conditions or relationships need to be developed between employers and their employees so that problems such as strikes don't happen?
5. In looking at the financial dependency of employees on industry for good wages; and industry on the government for higher prices for its goods to pay higher wages; and the need of employees to have more money to buy the goods at the higher prices, what can be done to keep the balance in perspective?
6. As you look at all the beautiful things you would like to buy that are produced by industry and as you look at the beautiful country you enjoy being scarred by industry, what is important to you? Do you feel that the best of both worlds is possible? How?

Objective 3

1. What are the costs and benefits of handicraft production? Mass production?
2. Industrial growth is considered a positive value in American society. Consider this value in light of the following five dilemmas:
   A. It is believed that an annual economic (Gross National Product) growth rate of between three and four percent is necessary if the United States economy is to escape a depression; it is also believed that if the quantity of production is maintained or increases, we will be faced with an irreversible environmental crisis.
   B. It is believed that only the individual citizen can effectively control pollution; but it is also believed that we live in a highly organized society, a society of corporations and institutions where the individual is quite helpless.
   C. It is believed that the government should trim spending; but it is also believed that large sums of money from the federal government will be necessary if pollution is to be controlled.
   D. It is believed that population (too many people) and the processes used in trying to meet the needs of people is the major cause of pollution; but it is believed also that an increasing population means an increasing market which is important to the growth of any economy.
   E. It is believed that the American society is one of the most mobile societies in the world, and this mobility is necessary in providing economic opportunities for our citizens; but it is also believed that the American preoccupation with movement has interferred with our ability to develop more stable families, communities and institutions.
3. What processes are used in industry to help eliminate poor decisions (guesses)?
4. What are your feelings about replacement of man by machine in industry?
5. What is your opinion of the feeling people describe—you're just a number?

Objective 4

1. Benjamin Franklin once observed that an education was not so important for *making a living* as it was in *giving a reason for living.* Discuss Franklin's statement as it applies to career choice.
2. How do people determine likes and dislikes? What factors (things) influence our decisions? (likes and dislikes)
3. To what extent are we willing to experiment with things we don't know? What and how much influence (advertising) needs to be exerted to get some people to try new things?
4. Have you ever done something or made something you didn't like? How did it affect you—what feeling did you have?
5. What are some things (tasks) you feel you are good at? How did you become good at performing the task or tasks? Consider ability, experience, desire, knowledge (acquired in various ways), and other factors that help us become craftsmen. What needs are there to continue to be good? (continued growth, etc. There are also limiting factors—age, changes in skill, etc.)
6. What are your feelings about janitors, cooks, maids, waitresses, etc. (service people)? How would your school change if the service people were not at your school? What would motivate a person to choose services as a way to earn a living?

7. How are improvements made in services and production? (The idea is to have students come to the awareness that many people contribute to research and development). What are some ways that improvements can be initiated?
   How have you changed—getting dressed? (your skill improved, different types of clothes, you have just learned more about it, suggestions from others, observing others, etc.)
   Are you an idea person, that is, are you thinking of ways to do things differently, suggesting for the group, etc.? Explain.
8. How do you think people on the assembly line feel doing the same job every minute of everyday, day in and day out? What would be your feelings doing assembly line work? What would be some of the advantages and disadvantages of doing assembly line work?
9. What are some of the qualities that people working with the public should have? How would you describe your self relative to the qualities you stated? What are some ways the qualities you described can be gained by yourself and others?

Objective 5

1. List five reasons for taking any specific job. Now rank order the five items starting with the one you value most to the one you value least.
2. How do you feel about the statement, "If you are going to do a job, do it right?" What could you do when you discover you don't know what is wrong with an automobile you are to fix? What is your feeling about the statement, "The customer is always right."?
3. Frequently, you hear people say in answer to why something is done as it is, "We have always done it that way." What is your reaction to this answer?
4. A mistake has been made in calculating the elevation of a street and the slope of the sewer pipes doesn't meet the required standards. Several blocks have already been laid. What is your reaction and suggestion for dealing with this situation?
5. What are the various ways of learning something you don't know? Which ways seem to work best for you?

~1~

Supplementary References

Books, Bulletins, Periodicals

1. American Vocational Association, *A Guide to Improving Instruction in Industrial Arts.* Washington, D. C.: American Vocational Association, 1968, p. 67.
   A recent structure and philosophy of industrial arts. Widely representative of a large committee. Authoritative.

2. Bloom, Benjamin S., Ed., *Taxonomy of Educational Objectives, Handbook I: Cognitive Domain.* New York: David McKay Company, Inc. 1956, p. 207.
   A basic reference in the knowledge domain with example for each level of the domain.

3. Cochran, Leslie H., *Innovative Programs in Industrial Education.* Bloomington, Illinois: McKnight and McKnight, 1970, p. 114.
   An overview of some twenty innovative programs in industrial education.

4. Gerbracht, Carl and Robert J. Babcock. *Elementary School Industrial Arts.* New York. Bruce Publishing Company, 1969, p. 280.
   A good reference to use when starting a K-1 industrial education program. The book covers such items as: Role of Industrial Arts in Elementary Schools; Programs for Exceptional Children; Facilities, Equipment, Tools and Supplies; Basic Skills; Projects and Activities; and the Role of the Industrial Arts Consultants. Has useful bibliographical references at the end of each chapter.

5. Gilbert, Harold G. *Children Study American Industry.* Dubuque. Wm. C. Brown Company, 1966, p. 211.
   Has a wide variety of industrial education activities for an elementary program. Contains units on Values and Procedures of Industrial Arts; Development of Industry; Manufacturing and Construction Activities; Transportation Activities; and Power Activities.

6. Krathwohl, David, et.al. Ed. *Taxonomy of Education Objectives—Affective Domain.* New York: David McKay Company, Inc., 1964, p. 196.
   A thorough treatment of the affective domain with examples for use in curriculum work.

7. Mager, Robert F., *Developing Attitude Toward Learning.* Palo Alto, California: Fearon Publishers, Inc., 1968, p. 104.
   Some suggestions on attitudes and how they may be developed.

8. Mager, Robert F., *Preparing Instructional Objectives.* Palo Alto, California: Fearon Publishers, Inc., 1962, p. 60.
   A fundamental treatment of instructional objectives and how to prepare them.

9. Mager, Robert F. and Beach, Kenneth M., Jr., *Developing Vocational Instruction.* Palo Alto, California: Fearon Publishers, Inc., 1967, p. 83.
   Use of the task analysis approach to vocational curriculum development.

10. Miller, William and Gardner, Boyd. *Teaching Elementary Industrial Arts.* South Holland, Illinois. Goodheart-Willcox Company, Inc., 1970, p. 224.
    Has units on the Role of Industrial Arts in the Elementary School; Methods and Materials of Construction; Correlating Constructional Activities With the Curriculum; Activity Area, Equipment, Tools, and Supplies. Also described are many projects and activities which are of interest to elementary youngsters.

11. Scobey, Mary-Margaret. *Teaching Children About Technology.* Bloomington, Illinois, McKnight and McKnight Publishing Company, 1968, p. 414.
    The author of this book has had a great deal of experience in elementary education and correlates many varied industrial activities with presently existing elementary school programs. The major parts of the book include Technology and the Elementary Curriculum; Major Industries of America; and Classroom Experiences. References at the end of each chapter are quite useful in obtaining materials for class presentations and many other purposes.

12. Simpson, Elizabeth Jane, *Illinois Teacher of Home Economics,* "The Classification of Educational Objectives, Psychomotor Domains", Volume X, No. 4, Winter 1966-67, pp. 110-144.
    A presentation of the psychomotor domain and its levels.

13. Stunnard, Arthur E. Ed. *Books: An Annotated Bibliography by the American Council for Elementary School Industrial Arts.* Publication No. 641-21338. Washington, D.C. American Industrial Arts Association, 1970, p. 201.

    This publication is very helpful in that it lists many reference materials which the author feels would be useful to elementary teachers who are teaching about industry to elementary children. It also has an extensive list of books which contain information, fictional stories, etc., which can be used as correlative reading materials when combining the study of industry with other elementary classes such as science, mathematics, English, reading, social science, etc.

14. Tyler, Louise L., *A Selected Guide to Curriculum Literature: An Annotated Bibliography.* Washington, D.C., Center for the Study of Instruction, National Education Association, 1970, p. 135.

    An excellent resource on recent curriculum materials together with a carefully prepared annotation of each reference.

Filmstrip, Tape Programs

The following 12 sets are available from VIMCET Associates, P. O. Box 24714, Los Angeles, California 90024. (Note that only those numbers in this set which are relevant have been included.)

1. "Systematic Instructional Decision Making"—An empirically based instructional model.
2. "Educational Objectives"—Developing precisely stated instructional goals.
3. "Selecting Appropriate Educational Objectives"—Modified versions of the Taxonomies of Education Objectives.
4. "Establishing Performance Standards"—Determining levels of learner proficiency.
6. "Perceived Purpose"—Establishing an "instructional set" for learners.
7. "Evaluation"—Judging the quality of instruction.
8. "A Curriculum Rationale"—An examination of Ralph Tyler's curriculum model.
9. "Defining Content for Objectives"—Objectives which possess broad content generality rather than test item equivalence.
10. "Identifying Affective Objectives"—Generating measurable instructional objectives in the affective domain.
11. "Analyzing Learning Outcomes"—An introduction to task analysis procedures.
13. "Teaching units and Lesson Plans"—Recommended elements of the two most popular forms of instructional plans.
16. "Modern Measurement Methods"—Uses of criterion referenced measurement and item sampling.

Bibliography

Throughout this publication is a variety of selected quotations used to support and give emphasis to the stated position. These quotations reflect current thinking appropriate to industrial education.

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